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IN THE

Supreme Court of the United States

October Term, 1967

No. 249

ANCHOR HOCKING GLASS CORPORATION,
Petitioner,

v.

CORNING GLASS WORKS,
Respondent.

RESPONDENT'S BRIEF IN OPPOSITION TO PETITION FOR WRIT OF CERTIORARI

There are no special or important reasons why the writ prayed for should be granted.

There is no conflict between decisions of Courts of Appeals, nor is there any important question of federal law which has not been, but should be, settled by this Court. There is nothing about this conventional suit for patent infringement which warrants review by this Court. The decision of the Court of Appeals for the Third Circuit, holding respondent's patent valid and enforceable, is manifestly right.

Opinions Below

The opinion of the Court of Appeals is reported at 374 F. 2d 473.

The opinion of the District Court is reported at 253 F. Supp. 461.*

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* The opinion of the Court of Appeals appears in Appendix A to the petition. The opinion of the District Court was not reproduced therein and, therefore, is reproduced as Appendix B to this brief for the convenience of this Court. The letters A or B followed by a number refer, respectively, to pages of these appendices.

Jurisdiction

Jurisdictional requisites are set forth in the petition.

Questions Presented

Questions 1, 2 and 4 do not present questions of law but rather are based upon inaccurate, argumentative, factual assertions unsupported by the record or the opinions of the Courts below.

Question 1 assumes a file wrapper estoppel which did not, in fact, exist, as shown by the decisions of the District Court and the Court of Appeals. The issue of infringement was not decided by the Courts below (A 13).

Question 2 is argumentative and wholly unsupported by the record or by the decisions of the Courts below in its reference to "affidavits of questionable accuracy" and "personal intervention of a retired former immediate superior of the examiner" (A 12-13; B 16-29).

Question 4 incorrectly states the holdings of both the District Court and the Court of Appeals.

Petitioner's question 3 purports to state a question of law but, in doing so, misinterprets the Court of Appeals decision. Both Courts below properly held that the claims' requirement of "at least 50%" of crystals was exact and definite and satisfied 35 U. S. C. § 112 judged by any standard. The Court of Appeals opinion, in addition, properly held that as a pioneer patent it should be accorded a liberality of construction. This phase of the Court of Appeals opinion follows what has long been the law of this Court as set forth in *Sessions* v. *Romadka*, 145 U. S. 29 (1892); *Eibel Co.* v. *Paper Co.*, 261 U. S. 45, 63 (1922); and *Smith* v. *Snow*, 294 U. S. 1, 14 (1934).

Statement of the Case.

The Stookey patent in suit (275a-283a) relates to ceramic materials produced by the controlled crystallization of glass. The District Court correctly found that "the

invention disclosed in the patent is a basic and pioneering advance in glass and ceramic technology." (B 5). The Court of Appeals agreed (A 6-7, A 13). The evidence amply supports this unanimous finding of the Courts below.

One of the patented products (patent example 15) was selected by engineers of the Applied Physics Laboratory at Johns Hopkins as the best available engineering material for making radomes (nose cones) for Navy guided missiles. The government in 1956 considered this radome use as a technical breakthrough (62a-63a, 285a-299a). No better material for these radomes has yet been found (63a).

This same patented product (called a glass-ceramic) was selected by a group of scientists at Penn State University as the best available material for making a new deep-sea diving vessel (the Benthos) for the United States Navy (68a-71a, 303a-306a). The Benthos is to be lowered into the deepest part of the ocean where it will be subjected to tremendous compressive forces.

The largest commercial use of Dr. Stookey's new glass-ceramics has been cooking and serving dishes sold under respondent's trademark CORNING WARE. This produet was first marketed in the Fall of 1958, and in 1960 respondent built a new plant for its manufacture having an annual capacity of about $40,000,000 worth (80a-81a). During the next four years, the plant had to be expanded twice (80a-81a).

Contrary to the statement in the petition (p. 14), the CORNING WARE formulation was developed by Stookey (617a-618a); it is very similar to and a refinement of patent Example 1 (615a-616a); and was found by the District Court to be covered by the patent in suit (B 13).

The awards received by Dr. Stookey for the invention in this patent include the Ross Coffin Purdy Award for the most valuable contribution to ceramic technical literature during 1958 (50a), the Toledo Award in 1964 from the Ohio section of the American Ceramic Society (51a), and the

John Price Wetherill Medal in 1962 by the Franklin Institute of Philadelphia (309a-314a, 112a-120a).

Professor Weyl of Penn State University, a long-time consultant of petitioner (246a), paid tribute to Stookey's invention in an article published in 1961 (569a-570a), saying:

> "Today, titania receives world wide attention because of Stookey's discovery[31] that TiO_2 can act as a catalyst for the formation of desirable crystalline phases which produce a ceramic material of high mechanical strength and low thermal expansion: pyroceram."
> [Reference 31 is to the Stookey patent in suit.]

Dr. Stookey has been acknowledged even by a group of Russian scientists as the originator of glass-ceramic materials (406a).

The prior art relied upon by petitioner was considered in the Patent Office and, as both Courts below agreed, does not begin to suggest Stookey's invention (A 6-7, A 13; B 5-13). Significantly, the petition avoids discussion of the prior art in any detail.

As originally filed, Stookey's application specified products containing 50 weight percent or more of crystals (278b, col. 13, ll. 64-69) and outlined an X-ray method of determining crystalline content of these products (287b, col. 13, ll. 29-57). Product claim 21 of the patent (289b) was relied upon in suit. This claim specifies a ceramic body made up of interlocked, inorganic crystals dispersed in a glassy matrix, specifies the crystal size as on the order of 0.1-20 microns in diameter, the amount of the crystals as "at least 50% of said body", states they are "formed by crystallization *in situ*", and then specifies the chemical composition of the original glass in which the crystals are formed. The method claims relied upon (1, 3, 5) define the initial glass-making composition that is melted and the two-stage heat treatment which is applied to this glass composition to produce the glass-ceramic product containing "at least 50%" of crystals.

Petitioner nowhere explains wherein the concrete claim limitation "at least 50%" of crystals was, or is, required to distinguish from the prior art. A similar limitation was used in original application claims 13 and 14 (292b) where the ceramic body was defined, *inter alia*, as made up of "a minor proportion" of a glassy matrix and "a major proportion" of crystals. This was simply one of several parameters used to define Stookey's new products.

Consistent with the District Court opinion, the Court of Appeals found (A 7) that the closest prior art was Dr. Stookey's own FOTOFORM products containing only 24-35% of crystals. Also, the District Court found (B 33) and the Court of Appeals agreed (A 9-10) that the unique properties of the patented products were not developed until the crystallinity reached the area of 40-60% of crystals.

The Courts below did not decide the issue of infringement. As to the crystallinity of petitioner's accused products, petitioner offered no evidence at the trial. Respondent's proofs showed these accused products contained over 70% crystals of all types (353a-356a, 125a).

The District Court held (B 30-32) that the language of the claims in the patent was an exact description and definite, satisfying the requirments of 35 U. S. C. § 112, as discussed by this Court in *General Electric Co.* v. *Wabash Appliance Corp.* 304 U. S. 364 (1938) and in *United Carbon Co.* v. *Binney & Smith Co.*, 317 U. S. 228 (1942). The Court of Appeals agreed (A 4-5).

The District Court held the patent in suit invalid for the sole reason that (B 33)

> "in 1960, when the patent issued, to determine the percent crystallinity within this 7 to 10% margin of error required costly and lengthy independent experimentation to devise a test to ascertain whether a product was within the bounds of the patent claims."

This holding was based on one sentence taken out of context from the decision of the Court of Appeals for the

Third Circuit in *Standard Oil Co. of California* v. *Tidewater Associated Oil Co.*, 154 F. 2d 579, 582-3 (3 Cir. 1946) (B 33).

The Court of Appeals on this point, held (A 12):

> "The evidence indicates that defendant could adequately measure the patent claims and that the 'great financial burden' was not foisted upon but rather assumed by Anchor [petitioner] in an effort to distinguish or break the Stookey patent—not to determine its limits."

This holding of the Court of Appeals was well supported by the evidence, including the following.

Petitioner purchased its first X-ray machine shortly after the patent issued (218a). One of its chemists, inexperienced in X-ray, was assigned to work with the machine (217a-218a, 246a-247a). Within a week or two, he was making quantitative measurements of crystallinity by the X-ray method (496a), and a week or two later had worked out a "Standard Method" (497a-501a). He continued to use this "Standard Method" for the next several months (502a-506a, 538a-543a, 593a-602a). By the end of the year, petitioner's chief chemist consulted experts on the X-ray method at Mellon Institute and was told that the X-ray method "can be expected to produce results with an error of 5% or less" (523a). In 1962, petitioner's chief chemist summarized his findings on the accuracy of the X-ray method in a report which stated, "The claims for the accuracy of the method range from $\pm$ 2% to $\pm$ 10%" (552a).

Respondent's scientists made crystallinity measurements not only by the X-ray method, but also by an electron microscope method starting in 1958 (409a, 133a-181a, 439a-489a). A third method, the age-old method of chemical analysis, was also used (356a-365a) in which the glassy parts are dissolved and the remaining crystals weighed to determine the percent of crystals in the body. The Court of Appeals found this latter to be "a common and inexpensive method available to Anchor to determine the limits of the Stookey patent" (A 11).

The record thus amply supports the conclusion of the Court of Appeals (A 12):

> "From the facts and circumstances concerning this invention and under the sound law of the case the only reasonable conclusion is that the patent was sufficiently described so that those who are skilled in the art were apprised of the patent claims and specifications without being forced to engage in costly independent experimentation."

Reasons for Denying the Writ

Petitioner first asserts that the decision below "jettisons" and disregards "the doctrine of file wrapper estoppel". Neither the District Court nor the Court of Appeals found any file wrapper estoppel in this case. No estoppel is spelled out by the history of the prosecution of the patent in suit, nor required by the prior art. The very premise of petitioner's first argument is, therefore, factually incorrect. Petitioner's own patent counsel, Mr. Wood, advised his client in 1961: "there was no file wrapper estoppel" (762a).

Petitioner next argues that Stookey's was not a pioneer patent. Both Courts below emphatically disagreed with this argument, and their conclusions are fully supported by the record.

Petitioner's third point is that the Court below applied a double standard of definiteness. Here, petitioner confuses the issue of definiteness with the question of liberality of construction. There can be no doubt that a pioneer patent is entitled to liberal construction. On the question of definiteness, both of the Courts below agreed that the claim language was definite. Indeed, no more exact language could be used in such claims than to require "at least 50%" of crystals. The Court of Appeals simply held that the District Court was wrong in finding that the percent of crystals in such products could not be measured with reasonable accuracy at the time the patent issued.

Petitioner's fourth point urges review of the case because of its "immense importance". Petitioner has not shown wherein the public has suffered, and the Court of Appeals answered this argument by stating (A 13)

> "... that the patent here found valid is a great basic invention which has brought substantial benefit to the public at large."

Neither has petitioner shown where this patent is of vital importance to the glass industry generally. Petitioner admits (p. 19) that it "is the only competitor marketing an allegedly infringing product." Petitioner does not add what the record shows, i.e., that the infringing product is a cheaply made copy of the patented product, and that petitioner from the outset deliberately embarked on its infringement program hoping to capitalize on a new business after it had been pioneered, developed and established by respondent.

CONCLUSION

The petition should be denied.

Respectfully submitted,

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APPENDIX B

District Court Opinion

Filed March 22, 1966

WRIGHT, CHIEF JUDGE.

This is a patent infringement action arising out of a single patent No. 2,920,971 (Stookey Patent) issued to plaintiff on January 12, 1960 upon an application of Stanley D. Stookey filed June 4, 1956. Plaintiff has been the sole owner of said patent since its issuance. The Court has jurisdiction and venue of the original action, based upon 28 U. S. C. A. § 1338a and § 1400b.

Plaintiff, Corning Glass Works (Corning), a New York corporation, with its principal place of business in Corning, New York, filed a complaint on November 8, 1963 charging that its Stookey patent had been infringed by the defendant, Anchor Hocking Glass Corporation (Anchor), a Delaware corporation with its principal place of business in Lancaster, Ohio. The complaint seeks a judgment that plaintiff's patent in suit is valid and has been infringed, that defendant be enjoined from further infringement, that an accounting be held to determine the damages and the plaintiff be awarded treble damages and its attorney fees and expenses, in addition to the costs of this action.

On December 30, 1963, Anchor answered denying infringement and alleged the patent in suit to be invalid: (a) because its claims are vague and indefinite, (b) because its method claims 1 to 11 are broader than the invention and cover inoperative species, and (c) because its claims are not patentable distinct from the prior art.

Defendant also charged that the plaintiff's patent was unenforceable because the patent was obtained by fraud on the Patent Office. With the answer, defendant filed a counterclaim for a declaratory judgment, raising the same issues as raised by the answer.

On April 26, 1965, defendant amended its answer and counterclaim. The amendment to the answer alleged that plaintiff's patent was unenforceable for misuse arising out of plaintiff's alleged unlawful fixing of resale prices in connection with plaintiff's fair trading of "Corning Ware."[1]

Plaintiff asserts that the allegations based on plaintiff's merchandising of "Corning Ware," even if proved, do not constitute a misuse of plaintiff's patent. Trial of this issue has been deferred to a future time.

The amendment to the counterclaim also added counts 2 and 3 asking for damages and injunctive relief. Count 2 alleged violation by plaintiff of § 2 of the Sherman Act[2] founded upon the allegation that plaintiff had obtained the patent in suit from the Patent Office by fraudulent misrepresentation and concealment. Count 3 alleges unfair competition by the plaintiff, based on the same fraud allegations as count 2. Counts 2 and 3 of the amended counterclaim have been tried, although the question of possible damages to defendant under these counts has been deferred for trial at a later date.

The issues to be decided at this juncture are (1) the validity of the patent No. 2,920,971, i.e., anticipation by the prior art, indefiniteness of the claims, inclusion in the claims of inoperative specie; (2) the fraud allegations and (3) infringement.

The Patent In Suit

The Stookey patent is directed to a method of producing ceramics by the devitrification (crystallization) of glass. This devitrified product has high mechanical strength, use-

[1] A trade name for a cooking vessel produced by Corning. This vessel is covered by the patent in suit.

[2] 15 U. S. C. A. § 2.

ful dielectric properties, and other properties which make it a desirable commercial product. There are 21 claims in the patent. Eleven are directed to the method of making the crystallized products and ten are directed to the resulting crystallized products.

In general, the patent first discusses the state of the art and then describes the theory and process to convert performed glass articles to crystalline ceramic bodies.

In discussing the state of the art, a distinction is made between the controlled hetrogeneous crystallization of the patent which results in a predominately crystalline product and the accidental and uncontrolled homogeneous crystallization which is encountered during the working of a glass. Homogeneous crystallization is undesirable as it forms coarse, nonuniform crystals which diminish the transparency and mechanical strength of the glass. Also discussed is a controlled crystallization commonly utilized for the production of light diffusing glasses, which is a form of homogeneous crystallization where the preliminary formation of nuclei is of the same composition as the crystals. Thus, only a limited amount of the total composition can be crystallized because of the small amount of crystallizable composition and the products remain glasses. The patent then discusses photosensitive glasses, which are not important here, and thereafter explains and distinguishes the Armistead patent[3] which is discussed infra.

The patent points out that a large variety of conventional glass making compositions containing TiO_2, after being formed into glass articles by conventional melting and glass forming operations, can be converted by a two-stage heat treatment to a crystalline ceramic body. The predominately crystalline ceramic is said to comprise a

[3] U. S. Patent No. 2,691,855 (hereinafter called the Armistead patent) application filed June 12, 1952, issued October 19, 1954 for high temperature thermometer tube and glass therefor.

multiplicity of very small interlocked crystals of the order of 0.1-20 microns in diameter and formed in situ from constituents of inorganic compounds in the glass other than the TiO_2. These crystals, formed during the heat treatment of the glass comprise at least 50% by weight of the product.

The patent teaches that TiO_2 is an effective nucleating agent, which causes the formation of submicroscopic nuclei in the glass during the first stage of the heat treatment. Upon heating the glass to a higher temperature, crystallization on these nuclei convert the glass to a crystalline product.

Typically, the product claims, 12-21, claim a ceramic body consisting essentially of a multiplicity of interlocked inorganic crystals dispersed in a glassy matrix, said crystals being on the order of 0.1-20 microns in diameter and constituting at least 50% of said body and formed by crystallization in situ from a glass consisting essentially of inorganic constitutents including 2-20% by weight of TiO_2, said glassy matrix consisting essentially of the uncrystallized portion of the glass remaining after crystallization of said crystals. Claim 21 defines these inorganic compounds of the glass composition as being at least 90% silica, alumina, titania and one or more of the basic metal oxides as defined in the patent. The titania content is defined as 2 to 20% by weight.

Claim 12 defines the product as above, except it does not specify the inorganic constituents of the glass or any titania content.

Claim 5 is representative of the method claims and defines a four-step method of making such predominately crystalline glass-ceramic products by a controlled crystallization. The four-steps are:

> "(1) melting a glass-making composition containing from 2-20% by weight of TiO_2, the ingredi-

ents Al_2O_3,SiO_2, plus at least one of the basic metal oxides from the group Li_2O, BeO, MgO, CaO, ZnO, SrO, CdO, BaO, PbO, MnO, FeO, CoO and NiO, with the SiO_2, Al_2O_3, TiO_2 plus basic metal oxides constituting at least 90% by weight of the glass making composition;

"(2) cooling this melt to form a glass;

"(3) exposing the glass to a temperature between the maximum nucleation temperature and the annealing temperature of the glass for a time of one minute to 100 hours;

"(4) and increasing the temperature of the glass to a temperature at which the glass making ingredients crystallize without melting, and holding the glass at this higher temperature until the product is 50% or more crystalline."

PRIOR ART

Whether the process or product of the instant patent is invalid for lack of invention and novelty over the prior art, because anticipated by it, must first be considered. The Court has concluded that both the method and product claims of the patent in suit are not anticipated by the prior art, and the invention disclosed in the patent is a basic and pioneering advance in glass and ceramic technology.

The major controversy revolves around the test codified by 35 U. S. C. A. 103 which provides that a patent may not be obtained "if the difference between the subject matter sought to be patented and the prior art (as defined in 35 U. S. C. A. 102)[4] are such that the subject matter as a whole

[4] 35 U. S. C. A. § 102 provides:

"A person shall be entitled to a patent unless—

(a) the invention was . . . patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for patent, or

(b) the invention was patented or described in a printed publication in this or a foreign country . . ., more than one year prior to the date of the application for patent in the United States . . ."

would have been obvious at the time the invention was made to a person having ordinary skill in the art to which such subject matter pertains. . . ."

Prior to applying this test a summary of Anchor's efforts in this area is helpful in ascertaining "the state of the art." In 1957, Anchor became interested in the Corning crystallized product (pyroceram)[5] and at least by October 15, 1958, Anchor was attempting to determine how to make it: At that time, they had already chemically analyzed the composition of a Corning pyroceram. On May 7, 1959, Dillard, head of research and development for Anchor, reported to Fischer, chairman of the board of Anchor, that certain melts made by Anchor showed promise. Nevertheless, it was not like the pyroceram that Stookey had developed. Prior to reaching this stage in the development of its pyroceram program, Anchor had gleaned information that TiO_2 was the crucial nucleating agent in Corning's pyroceram from a disclosure in a Belgian trade magazine concerning Corning's copending application for a Belgian patent. Even with this knowledge it is doubtful that Anchor, whose research and development team were surely skilled in the art of glass technology, was able to develop a usable pyroceram until the Belgian patent was sent to them on September 26, 1959. Although the Anchor people had not studied the articles on which they rely as prior art, their inability to develop pyroceram quickly, especially since Anchor knew pyroceram's chemical composition and that 2-20% titania was used as a nucleating agent, indicates that the method of making pyroceram was not obvious to one skilled in the art.

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[5] A term adopted by Corning to describe the crystallized end product of the patent.

Of the patents and articles relied upon by the defendant to invalidate the patent, three[6] of the four[7] which defendant's expert testified were closest to the Stookey patent, were cited by the Patent Office. A presumption of validity attaches to a patent, 35 U. S. C. A. § 282, and greatly detracts from the weight to be given to prior art provided the Patent Office had such prior art before it.[8] Of the four, the one not cited by the Patent Office, the "Gambarian article" is not pertinent so as to destroy this presumption of validity.[9] Nevertheless, absent the presumption of validity, the prior art is inadequate to defeat the enforceability of the patent.

True, if one carefully selects various facts, methods and compositions from the above mentioned patents and articles, it is possible to construct the methods and compositions of the Stookey patent. However, such selection is not obvious to one skilled in the art except by hindsight.[10]

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[6] U. S. Patent No. 1,893,382, application filed June 16, 1930, issued Jan. 3, 1933, for a method of making cast basalt articles (hereinafter called the Watson patent); U. S. Patent No. 2,132,390, application filed July 3, 1935, issued Oct. 11, 1938 for diffusing glasses (hereinafter called the Blau patent); Armistead patent, *supra*, note 3.

[7] *Supra*, note 6; P. P. Gambarian, F. G. Arutiunian, and L. A. Rotiniants, Investigation of the Conditions of Crystallization of Melted Basalts, Collected Works of the Institute of Scientific Research of the People's Commissariat of Heavy Industry of the Armenian SSR, 1, p. 85, (1933) (hereinafter called the Gambarian article).

[8] E.g., Manville Boiler Co. v. Columbia Boiler Co. of Pottstown, 269 F. 2d 600 (4 Cir. 1959) cert. denied 361 U. S. 901 (1959); Georgia-Pacific Corp. v. United States Plywood Corp., 258 F. 2d 124 (2 Cir. 1958) cert. denied 358 U. S. 884 (1958); Hartford National Bank and Trust Co. v. E. F. Drew & Co., 237 F. 2d 594 (3 Cir. 1956).

[9] Cf: e.g., Hartford Nat. Bank & Trust Co. v. E. F. Drew & Co., 133 F. Supp. 648 (D. Del. 1955), aff'd. 237 F. 2d 594 (3 Cir. 1956).

[10] Compare Great Atlantic & Pacific Tea Co. v. Supermarket Equipment Corp., 340 U. S. 147 (1950).

District Court Opinion

The Blau patent, which was cited by the Patent Office, describes the manufacture of a light diffusing glass known as floride opal glass. The untreated glass composition contains less than 3% of florides and does not contain any titania. The patent does disclose using a two-step heat treatment; the initial heating is to form nuclei and the second is to cause crystal growth upon the nuclei. The thrust of the patent is to produce crystals to opacify the glass. Nothing in the patent discloses that properties other than opacification will change or that a predominately crystalline body can be made. In fact, regardless of the length of the heat treatment, it is doubtful that a predominately crystalline body can be formed from the Blau composition, especially since the composition does not contain titania. Moreover, there is no teaching concerning the size or the interlocking of these crystals. Only small interlocked crystals, as claimed in the Stookey patent, create the desirable properties obtained by the patentee whereas large homogeneous or noninterlocked crystals are usually weak and undesirable. Also, even though Blau teaches a two-stage heat treatment, it is the reverse of Stookey's. Nuclei are formed at a high temperature and the crystal growth is developed at lower temperature, "e.g. not over about 1300° F."[11] (704°C.). On the other hand, Stookey uses a low nucleating temperature of approximately 820°C. and a high crystallizing temperature of approximately 1345°C.

The second patent involved, which was cited by the Patent Office, is the Armistead patent. This patent is directed to forming a white stripe directly behind the bore of a thermometer tube, which is then encased in a clear glass to make a high temperature thermometer. The opacifying agent in this stripe of glass is titania. The patent teaches that the titania is completely dissolved in the glass during melting and is reprecipated as a uniformly finely

[11] Blau patent, *supra*, note 6, p. 3, right column, line 44.

divided precipitate by subsequent heat treatment. The heat treatment consists of cooling the glass below its nucleation temperature and then reheating it above its nucleation point but below its liquidus to cause nuclei to grow by recrystallization. This treatment is only to cause opacification. True, if the glass was held at the recrystallization temperature long enough, a Stookey glass ceramic could be formed.[12] However, the patent itself does not disclose or suggest using a Stookey heat treatment, nor disclose or suggest that a glass ceramic could be made. Indeed, if a Stookey product had been made, it would have been unsatisfactory for thermometer tubing since it could not be drawn to make the tubing. Thus crystallization beyond the need of making an opacified product would have been avoided and been undesirable.[13] Moreover, the evidence shows that by following the teachings of the Armistead patent only 30.3% of crystals by weight would develop while the changes and properties which Stookey disclosed only begin to develop at 40% by weight crystallization.

The prior art, on which the defendant places its heaviest reliance, is the 1933 Watson patent, which relates to making cast basalt articles by fusing and casting volcanic rock by means of a special heat treatment. Watson teaches taking a basalt, melting it in a reducing atmosphere, casting it in molds in the desired shape, placing the molds in saggers

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[12] See text, *infra*, under heading of "Unclean Hands."

[13] Judge L. Hand reasoned much the same way in distinguishing an allegedly prior art patent in Dewey & Almy Chemical Co. v. Mimex Co., 124 F. 2d 986, 990 (2 Cir. 1942):

> Again, instead of directing practitioners of his method to mix gum and pigment, Newton told them to avoid gums; true, that was one way to do it, but a bad way, for gums "are liable to be washed out before the color is entirely set." Indeed, the whole purpose of the invention was "to remedy this"; so that, instead of prescribing the method that Miller [the inventor] employed to make a synthetic "bentonite", Newton pointed in directly the opposite direction.

containing a mixture of sand and graphite, heating it to 725° C. for approximately one hour and then reheating at 900° C. for one hour after which it is cooled to room temperature. Using this method, Watson points out that the recrystallization begins at the surface and proceeds to the center, but, nevertheless, a thin layer of vitreous material forms on the surface.

Watson also teaches that an oxidizing atmosphere can be used; however a two-step heat treatment cannot be used as the product would remain vitreous throughout the mass. Instead Watson teaches taking the melted basalt directly to 900° C., which will produce a devitrified product crystallizing from the center outward. The surface retains a vitreous skin.

Examining the first method, i.e., reducing atmosphere, which has the two-step heat treatment, it is apparent that the product which results is not the same as a glass ceramic. Crystallization by this method starts with the exterior whereas in Stookey the crystals form uniformly throughout the mass.

Watson's second method produces crystallization from the center outward; however, it is necessary to have an oxidizing atmosphere plus the fact that the two-stage heat treatment, if used, will produce only a vitreous product.

The patent does not suggest or teach that a new combination of properties can be had by its methods, nor does it suggest that small crystals, 0.1-20 microns in diameter, will be formed.[14] Most importantly, the patent leaves the choice

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[14] For an analogous situation see Newburgh Moire Co. v. Superior Moire Co., 237 F. 2d 283 (3 Cir. 1956). In that case, the attack on the patent's validity is very similar to the one at bar. The attackers used the same method of selecting parts of prior patents to argue anticipation. The Third Circuit Court of Appeals rejected this argument.

of a basalt to be used to any person attempting to follow the patent and there are thousands of them.[15] Thus, the composition of the original substance is not disclosed and does not guide anyone in preparing a Stookey composition. Furthermore, there is no inkling that a person could form a glass article containing titania and then use a two-stage heat treatment to form a glass ceramic.

In Watson the atmosphere used is critical, whereas in Stookey, the atmosphere is unimportant. In Stookey, on the other hand, the use of titania is one of the critical factors while Watson does not teach anything concerning it. In fact, if 5% titania is added to a melted basalt and the Watson two-stage heat treatment is followed, crystallization is inhibited rather than promoted.[16]

Unlike the previous three patents discussed—Watson, Armistead and Blau—which were cited by the Patent Office,

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[15] Many cases have refused to consider a patent or article as an anticipation if its teaching will sometimes succeed and sometimes fail, e.g., Dewey & Almy Chemical Co. v. Mimex Co., *supra*, note 13, however, this case need not rest on this ground specifically.

[16] DX-3, p. 5. This experiment was reported in a patent application by Dr. Cyrus Klingsberg of the Corning Glass Works, which application never reached fruition. The experiment illustrates that a person would not realize that titania was a crucial factor in making pyrocerams. For example, a person could not chemically analyze a basalt and by using a trial and error method of increasing and decreasing the amounts of the various constituents determine that titania was the crucial item in crystallizing the few crystallizable basalts. It should be noted, however, that the atmosphere, whether oxidizing, reducing or neutral, is not disclosed, thus it could also be argued that had a reducing atmosphere been used, the basalt would have crystallized. This would indicate that the atmosphere is critical to the operation and not the titania content, thus illustrating the difference between Watson and Stookey as stated in the text.

defendant also urges that various articles,[17] both foreign and domestic, which were not cited by the Patent Office, make obvious the production of a glass ceramic *a la* Stookey. The Court concurs with defendant's expert who testified that of the articles relied upon by defendant if the Russian article by Gambarian, et al., does not anticipate or make obvious Stookey's patent disclosure, no article renders Stookey's "invention" obvious under the test of 35 U. S. C. A. § 103. Moreover, defendant does not urge these other articles in its brief.

The Gambarian article is concerned with purely experimental work on different kinds of basalts. The article discusses heat treatment of basalts to form crystallized products; however, it does not describe the two-stage heat treatment of Stookey's nor do the same small crystals result. In a later article by Rotiniants,[18] who continued Gambarian's work and was a co-author of the Gambarian article, he pointed out that of the articles formed, those having the coarser crystals did not shatter on being struck, but the finer crystalline ones did. This indicates that a spontaneous crystallization took place and not the Stookey heterogeneous crystallization. The heterogeneous nucleation disclosed by Stookey forms small interlocked crystals which are much stronger than the coarse homogeneous

[17] Navias, Compositions and Properties of Some High-Titania Ceramics, 24 Journal of The American Ceramic Society, 148 (1941); Korovnichenko, The Basalts of the Volmovakni River as the Source of Petrurgical Raw Materials in the Don Basin (1941); Portevin, The Molten Basalt, Mem. Soc. Ing. Civils France 266 (1928); Bigot, Basic Glasses Industry (1923); Purdy and Krehbiel, Crystalline Glazes, Trans. American Ceramic Society (1907); De Reaumur, Art of Making a New Kind of Porcelain, Memoirs Royal Academy of Sciences Paris (1739); Gambarian et al, *supra*, footnote 7.

[18] Rotiniants, Experiment on the Casting and Annealing of Basalts in Sand Molds (Third Report) (undated).

crystals which had been commonly known and were formed in the Gambarian experiments. Moreover, the basalts used by Gambarian did not have 2-20% titania in their composition and, furthermore, the crystallization began at the edge of the product and did not occur uniformily throughout the mass. The Gambarian, et al., article was an invitation to do more experimentation concerning basalts and did not come near to revealing or suggesting either the Stookey heat treatment, the Stookey raw compositions, or the Stookey product.

Finally, the great commercial success of the patented products is entitled to some weight to prove invention.[19]

Corning has been highly successful in marketing articles of pyroceram. They have manufactured and sold over $10,000,000 worth of pyroceram radomes (nose cones for guided missiles) to the U. S. Government from 1956 to date because of pyrocerams unique properties. The government has also fabricated a deep sea diving vessel, the Benthos, of pyroceram because of its ability to withstand tremendous compressive forces. The most successful product in terms of sales dollars (over $100,000,000) is "Corning Ware", a cooking vessel which can withstand high thermal shock. It is true that various influences, advertising, market promotion, packaging, etc., had considerable effect on the sales record of "Corning Ware"; however, this does not entirely account for its commercial success. There is no question that pyroceram fulfilled a commercial need.

The patentability of Stookey's invention is further buttressed by the experiments reported in the next section since the Court has concluded that these experiments were honestly and accurately performed.

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[19] E.g., Hartford National Bank & Trust Co. v. E. F. Drew & Co., 237 F. 2d 594 (3 Cir. 1956); compare Philco Corp. v. Admiral Corp., 199 F. Supp. 797 (D. Del. 1961).

District Court Opinion

FRAUD

Defendant has alleged that plaintiff perpetrated a fraud on the Patent Office in order to obtain its patent on pyroceram. Not only does the defendant's argument on this point go to the enforceability of the patent but two of defendant's counterclaims also rest upon it. Defendant contends that fraudulent statements were submitted to the Patent Office by the plaintiff in three affidavits and the written arguments by plaintiff's solicitor. These allegedly false statements were used in attempting to distinguish the prior art.

Having found the plaintiff had an invention which was patentable over the prior art,[20] as a legal proposition, defendant's allegations of fraud must fail. Not only must the defendant establish that an intentional misrepresentation was made to the patent examiner, but also defendant must show that the misrepresentation was material, i.e., that the patent would not have issued but for the fraud.[21] Since the patentee was legally entitled to the patent, any misrepresentation directed to overcoming the prior art, assuming arguendo there were some, could not be material.

A recent Supreme Court case, Walker Process Equipment, Inc. v. Ford Machinery and Chemical Corp.,[22] which conclusively settled the issue that obtaining a patent by means of fraud upon the Patent Office can be the basis for an anti-trust suit, necessarily assumed that the intentional misrepresentations were a material factor in obtaining the

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[20] See text, *supra*, under heading "Prior Art".

[21] Corona Cord Tire Co. v. Dovan Chemical Corp., 276 U. S. 358 (1928); Baldwin-Lima-Hamilton Corp. v. Tatnall Meas. Systems Co., 169 F. Supp. 1 (E. D. Pa. 1958), aff'd. per curiam 268 F. 2d 395 (3 Cir. 1959), cert. denied 361 U. S. 894 (1959).

[22] No. 13—October Term, 1965. Sup. Ct. Dec. 6, 1965.

patent.[23] If one were entitled to a patent under the legal tests of patentability, there is no illegal monopoly resulting from the statements on which to base an anti-trust action. Consequently, the counterclaim based on fraudulently obtaining the patent in contravention of § 2 of the Sherman Act[24] fails. The common law fraud counterclaim fails for the same reason.[25]

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[23] Some of the language in the Walker case, *supra*, note 22, might seem to support the opposite conclusion. For instance the Court quotes from Precision Instrument Mfg. Co. v. Automotive Maintenance Machinery Co., 324 U. S. 806 (1945):

> "... The far-reaching social and economic consequences of a patent, therefore, give the public a paramount interest in seeing that patent monopolies spring from backgrounds free from fraud or other inequitable conduct and that such monopolies are kept within their legitimate scope."

however, the Court continues:

> "Walker's counterclaim alleged that Food Machinery *obtained* the patent by knowingly and willfully misrepresenting facts to the Patent Office. Proof of this assertion would be sufficient to strip Food Machinery of its exemption from the anti-trust laws." (Emphasis added)

This case did not explicitly consider the question of materiality although the court, by using the word "obtained" in the above quote, implies that the misrepresentations must be material. Statements made prior to the above quotes also imply materiality:

> "It must be remembered that we deal only with a special class of patents, in those procured by intentional fraud. ... To permit recovery of treble damages for the fraudulent procurement of the patent coupled with violations of § 2 accords with these long recognized principles."

The words, "procurement" and "procure" imply that the patent must issue because of the fraud, i.e., materiality. Moreover, this case arose under a motion to dismiss and the Court could not decide on a factual basis, as in the case at bar, that the misrepresentations were not material.

[24] 15 U. S. C. A. § 2.

[25] See Prosser on Torts § 89 (2nd Ed. 1955); Harper & James, The Law of Torts § 7.13 (1956).

District Court Opinion

Unclean Hands

Even though misrepresentations made to the Patent Office are not legally material to the issuance of a patent, nevertheless, this Court, being a court of equity, can and should refuse to enforce the patent if the Court finds the patentee made intentional misrepresentations to the patent examiner, i.e., if the patentee came into the court with unclean hands.[26] The proceeding before the patent examiner is ex parte and an examiner has no way, in many cases, to ascertain the truthfulness of the representations made to him. Necessarily he must rely on the good faith of the applicant. Absolute honesty and good faith disclosure is necessary.

One practical reason for this requirement is that when any intentional misrepresentations are made to the Patent Office, it makes the findings of the examiner suspect and destroys any presumption of validity, which attaches when the Patent Office issues a patent. Once intentional misrepresentations are involved, the court has the burden of determining whether or not the misrepresentations were relied upon by the examiner and whether, absent such reliance, the patent should have issued.[27] In effect, the Court is deprived of the benefit of the Patent Office's expertise in making the initial findings concerning patentability. Enforcing a patent in behalf of one who has made intentional misrepresentations to the Patent Office, irrespective of the merits of his patent application, might encourage an applicant to be dishonest in dealing with the

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[26] Precision Instrument Manufacturing Co. v. Automotive Maintenance Machinery Co., 324 U. S. 806 (1945).

[27] Not all intentional misrepresentations will prevent the enforcement of the patent, but the representations must be relevant and significant. For example, if a false answer is given to the patent examiner when he asks "How are you", surely a false answer will not prevent the enforcement of the patent. Less obvious examples can be postulated.

Patent Office, thus preventing the office from functioning properly.[28]

To successfully assert that intentional misrepresentations were made, the standard of proof to be met is not a preponderance of the evidence but the intentional misrepresentations must be proved to a reasonable degree of certainty, otherwise the defense of unclean hands cannot be upheld.[29]

Having examined the allegedly false statements, the Court concludes that the defendant has not met its burden in proving (1) any false or misleading statements were made, except the one representation made by plaintiff's solicitor to the patent examiner that basalts do not contain TiO_2, and (2) an intent to deceive the examiner. At most defendant's evidence establishes that the method of conducting the experiments reported in the affidavits might have been done more carefully or in a different manner. Ultimately, the testimony on this point resolves itself into a conflict of experts' opinions as to the best means of conducting the experiments. The affidavits attacked were filed by Dr. R. M. Witucki, Dr. Cyrus Klingsberg and Dr. H. D. Kivlighn and each with the accompanying argument by plaintiff's solicitor will be considered seriatim.

THE WITUCKI AFFIDAVIT

Before the Stookey application was filed with the Patent Office, Corning realized that the Armistead patent might be cited by the patent examiner as prior art. In anticipation of this event, Dr. R. M. Witucki was instructed to devise an experiment which would show that Armistead's

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[28] The Courts are not insensitive to economic coercive power which an invalid patent gives its holder. See Note, 112 U. Pa. L. Rev. 1169, 1170 (1964).

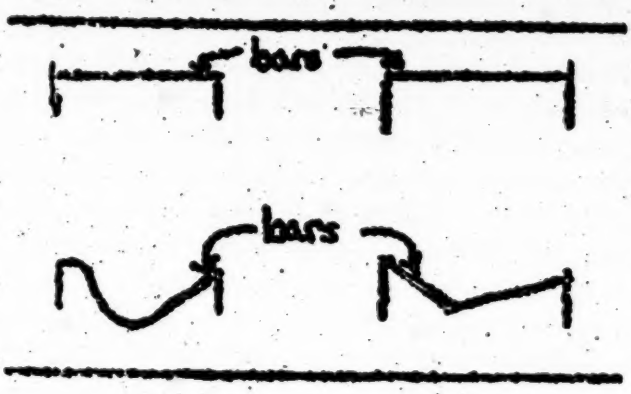
[29] Baldwin-Lima-Hamilton Corp. v. Tatnall Meas. Sys. Co., *supra*, note 21.

thermometer glass was different from the Stookey product. Dr. Witucki decided to heat treat both Armistead and Stookey compositions using the Stookey and Armistead methods. He then intended to give them a sag test, i.e., put them in a furnace across two knife edges about 6" apart and heat them for a period of time. Evidently Dr. Witucki equated crystallinity with nondeformability. Based on this premise Dr. Witucki reasoned that if a Stookey composition heat treated by the Stookey method did not sag and an Armistead composition heat treated by the Armistead method did, the test would show that both the Stookey composition and heat treatment were different from Armistead's. However, Dr. Witucki could not expect to prove that both Stookey's heat treatment and compositions were different from Armistead's since Armistead's untreated compositions were included within the compositions of Stookey's patent. At best, the experiment could only differentiate the heat treatments.

Witucki completed his experiments and filed a written report concerning them with the Corning patent office on September 28, 1956. In the meantime, Stookey's patent application was filed on June 4, 1956. In March 1957, Stookey's application was rejected by the Patent Office based on the Blau and Armistead patents. Witucki's affidavit, based on the previous experiments and report, was then filed with the Patent Office to distinguish the Armistead patent.

In the affidavit, Dr. Witucki stated that he took both an Armistead and a Stookey composition and subjected them to an Armistead heat treatment and also that he took the same compositions and subjected them to a Stookey heat treatment. He stated that he then took the four bars, put them across knife edges 6" apart and gave them a sag test by heating them at 1150° C. for 17 minutes. Both bars which were given the Armistead heat treatment sagged and

the ones given the Stookey heat treatment remained perfectly straight. The following is a copy of the diagram attached to Witucki's affidavit:



Defendant's first criticism of the Witucki affidavit is that the affidavit stated its purpose was to show a difference in kind rather than degree between Armistead and Stookey and the above test was completely unsuitable to either prove or disprove this point. Merely stating the proposition illustrates that this statement does not show any intentional misrepresentation. It is a matter of opinion as to what the result proved. The examiner, who is an expert, could draw his own conclusions when looking at the above diagram. If it did not show a difference in kind, he should have recognized it and rejected the application. Moreover, the Court is convinced that the above experiment shows that the Stookey heat treatment creates a highly crystalline product, which will not deform at the same temperature as a glass. There is ample information in the record that when a glass material crystallizes, it can be subjected to a much higher temperature without deforming than a glass of the same composition.

Secondly, defendant asserts that Witucki's statement—"that he studied the cycle of temperatures employed in the commercial production of thermometer tubing"—is misleading in that the statement implies that he, Witucki, studied an Armistead thermometer cycle and the cycle used in the affidavit was actually found to be in use. The implications of the affidavit are what the reader wishes to place there. The affidavit clearly states what Witucki did and does not need any interpretation. It does not say Witucki studied or observed Armistead thermometers actually being made.[30] Indeed, Dr. Witucki relied upon a report by Dr. Harrington of a commercial thermometer heat cycle, the only one then in production. However, Dr. Witucki personally observed the cycle to determine the accuracy of the report. After studying the Armistead patent the commercial cycle was adjusted upwards by 200° C. to approximate the Armistead cycle. Anchor's experts did not dispute that the time and temperatures actually used were accurate and, furthermore, Dr. Armistead, the inventor of the Armistead glass, testified that the time and temperature cycle used by Witucki was more conducive to making a Stookey glass ceramic than the one used in making an Armistead thermometer.

Defendants also complain that Dr. Witucki did not use the chemical compositions of Armistead Example 1 and Stookey Example 15 in his experiments as stated in his affidavit. Defendant relies on various notebook pages of Dr. Witucki to show that compositions which do not correspond to the examples were melted. True, Dr. Witucki's notebook discloses that incorrect compositions were melted in April 1956. These incorrect compositions were drawn

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[30] In fact, Corning only makes them once every few years so that observing an Armistead high temperature thermometer cycle would be impractical unless Armistead thermometers were being made at this time or a commercial run was specially set up.

into canes and subjected to tests. However, the Court does not agree with defendant's conclusion that these were the experiments recorded in the affidavit. At the bottom of these notebook pages is the notation that remelts were made in June 1956, which were subjected to later experiments. These remelts were of the correct composition, were cast in the form of bars and were designated by a prime mark, which prime mark is contained in all subsequent notations and experiments. In Dr. Witucki's summary report dated September 28, 1956, he specifically refers to bars of the composition which had been annealed and cut. The incorrect melts were canes, consequently the information for the affidavit must have been taken from Dr. Witucki's report of the later experiment using the remelts. Moreover, the affidavit follows the same procedure and uses the same wording of this report. Furthermore, Dr. Swan, Dr. Witucki's assistant, recorded in his notebook the same experiments recorded in the Witucki summary of September 1956, and which were reported in Witucki's affidavit. He also uses the primes on the glass compositions. Moreover, Dr. Witucki testified that in July and August when the affidavit experiments were run, he used the correct compositions.

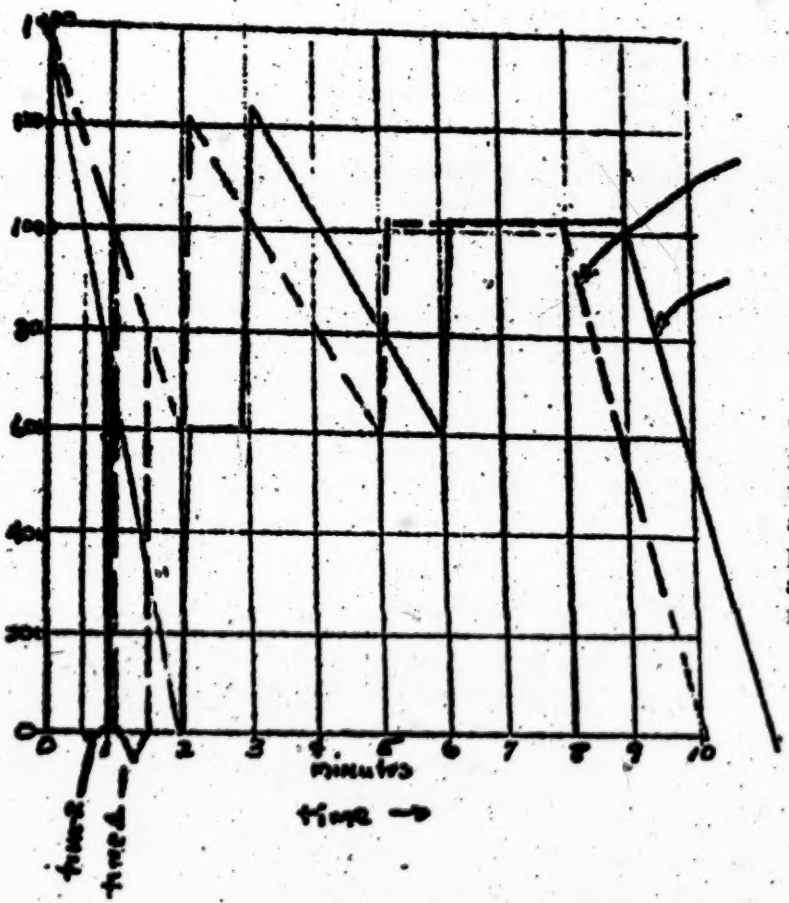
Another criticism concerns the statement in the affidavit about the Armistead heat treatment in "that the glasses were thereby cooled so rapidly through the nucleation range that no substantial nucleation of and by TiO_2 occurred." Defendant contends this is contrary to the Armistead teachings. First, it should be pointed out, that this is a conclusory statement by Dr. Witucki which undoubtedly Dr. Witucki believed. Since at that time the nuclei were undetectable visually or by any other means, this conclusion by Dr. Witucki must have been drawn from the fact that a ceramic was not made. Secondly, the actual procedure for cooling the glass is stated in the affidavit. Thirdly, the Armistead patent does not give any instructions on

the cooling rate but only says "The nucleation temperature, that is, the temperature at which invisible nuclei of TiO_2 begin to form, is lower than the liquidus. Consequently, opacification is brought about by cooling the glass substantially below its nucleation temperature, generally below 1000°-1200° C., to form such invisible nuclei and thereafter reheating. . . ."[31] This is exactly what was done. The entire procedure was stated in the affidavit and the patent examiner was satisfied with it. He could draw his own conclusion.[32]

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[31] Armistead patent, *supra*, note 3, Col. 3, lines 5-12.

[32] Incidentally, defendant could have criticized the Witucki experiment on the basis that it departed from the actual heat treatment of an Armistead thermometer glass. In the actual Armistead operation, the glass is not cooled to room temperature after being melted, but is cooled only to 600° C., the temperature of the clear glass boule to which it is applied. Assuming the times remained the same for the different operations, this would result in the Armistead thermometer glass remaining within the nucleating temperature range for a longer period of time than the glass in Dr. Witucki's experiment. A diagram of the heat-time cycle will illustrate the point.



As can be seen, on the cooling of the initial melt, assuming nucleation takes place between 800°-1000° C., under the Armistead thermometer heat cycle the glass would be in this range a little over 30 secs ($time_1$), while in Dr. Witucki's experiment the glass was within this range about half this amount of time ($time_2$). Nevertheless, defendant did not urge this as a significant deviation nor did the examiner attribute any significance to it. Moreover, the defendant did not submit any experimental evidence which would show that this difference was significant so this Court attaches no significance to this fact.

Finally, defendant argues that certain tests which Dr. Witucki conducted and certain words used in Dr. Witucki's summary report of September 28, 1956 were omitted from his affidavit. Dr. Witucki did apply sag tests to the bars at both 1100° C. and 1200° C. which were not included in his affidavit. At 1200° C., a Stookey heat treated bar as well as an Armistead heat treated bar sagged. No significance was attached to this test by Corning since it was assumed, justifiably so, that both bars were above their liquidus. It neither proved or disapproved anything. On conducting the sag test at 1100° C., an Armistead heat treated bar sagged in the first few minutes, but the continued heating during the test cerammed the bar and it did not continue to sag. This would indicate that the lengthy Stookey heat treatment was critical to making glass ceramics. Not reporting this test cannot be fraudulent for it would have helped to prove this point.

Reporting the 1150° C. test as diagramed, supra, was dramatic evidence of the uniqueness of the Stookey heat treatment, and the Court cannot conclude that by submitting its best test to prove its point Corning was acting fraudulently or making a misrepresentation.

As for omitting from the affidavit that Dr. Witucki used terms in his report[33] characterizing products resulting from using Armistead heat treatments on Armistead compositions as "apparently good ceramics" or "apparent ceramic which is fragile" is not blameworthy, especially in view of Dr. Witucki's conclusion on the first page of his report. He stated "It was found that the high temperature thermometer opal heat treatment does not develop good ceramic properties." Moreover, when the patentee's solicitor

[33] PX 122. Report by Dr. R. M. Witucki to the Corning Patent Department entitled "Effect of Heating Cycles on the High Temperature Deformation of a High Temperature Thermometer Opal Glass and on 607 BUZ.," Sept. 28, 1956.

represented to the examiner that the Armistead method produces a predominantly glassy body he was correct as a consideration of all the evidence shows.

THE KLINGSBERG AND KIVLIGHN AFFIDAVITS

After considering the various arguments made by patentee's solicitor and the Witucki affidavit, the patent examiner still rejected all of the patentee's claims based on (1) combining the Armistead patent with the newly cited Watson patent, and (2) on Watson alone. In order to show that by following the Watson patent a Stookey product was not obtained, Corning filed various affidavits, one of which was executed by Dr. Cyrus Klingsberg. Defendant has alleged that various misleading statements were made in this affidavit and the accompanying argument by patentee's solicitor. There is no doubt that misrepresentations, if any, in the affidavit were not material to the issuance of the patent. The patent examiner rejected the applicability of the affidavit on the grounds that the Watson method was not followed. However, as discussed previously, the Court is still forced to consider whether the Klingsberg affidavit contained any intentional misrepresentations.

The affidavit describes the various steps pursued by Dr. Klingsberg in attempting to follow the Watson patent. An analysis of the resulting product is included. After the patent examiner rejected the applicability of this affidavit, another affidavit (the Kivlighn Affidavit) was filed by Corning. In it, Dr. Kivlighn also recited experiments which purported to follow Watson's teachings and contained analyses of the resulting products. As defendant's allegations of intentional misrepresentations and omissions cover both affidavits and, in many cases, are identical criticisms, they will be discussed together.

Defendant's first point is that the affidavits imply that a representative basalt was used; but the actual basalt used

was atypical since it was low in TiO_2. Neither of the affidavits state that a certain or a representative basalt was used. The implication of the affidavit is what one wishes to draw. True, the basalt used was a Jefferson County, Colorado basalt, which, according to the experts, contains approximately 0.82 to 1.0% TiO_2. This is somewhat below the average TiO_2 content in basalts, however, there is no indication that Corning chose this basalt because of its low TiO_2 content. Moreover, Dr. Klingsberg, who holds a master's degree in geology, testified that when he performed the experiments and executed the affidavit, he thought the basalt was fairly representative. However, even if Doctors Klingsberg or Kivlighn knew that the basalt used was low in TiO_2 still they were within the teaching of the Watson patent since it does not state that a particular basalt or one with a certain chemical composition should be used. The choice was left to the one attempting to follow it. On these facts, the Court cannot conclude that the use of the Jefferson County, Colorado, basalt was wrong.

Defendant's second allegation is that both Klingsberg and Kivlighn melted the basalts for an excessive period of time. Klingsberg melted the basalt for 7 hours, Kivlighn for 16 hours. Granting that the basalts would melt within 3 hours, provided the basalt sample is not extremely large, and that excess heat would tend to interfere with subsequent crystallization, again there is no evidence that either of these scientists intended to prevent crystallization by this means or even that they knew that excess heat would interfere with crystallization. Dr. Kivlighn testified it was standard at Corning to melt items overnight. Logically, he followed this procedure. Moreover, the Watson patent did not suggest that excess heat would interfere with the development of its product. The person following the patent had his choice of melting time.

Defendant contests the so-called assumption in both affidavits that the melts were made in a reducing atmosphere,

which Watson teaches is critical. Both Klingsberg and Kivlighn used electric and not gas fired furnaces so an Orsat analysis could not be made of the flue gas. Consequently, neither scientist ran any tests to determine whether they had a reducing atmosphere. However, both scientists correctly assumed they did. The crucible in which the basalt was melted was placed inside another crucible which contained graphite. Since no air was added to the furnace, the carbon in the graphite would combine with the oxygen in the air to form carbon monoxide, which would normally create a reducing atmosphere. Additionally, the entire procedure was disclosed to the examiner in the affidavits.

Defendant takes exception to the Klingsberg affidavit asserting that the reported visual and X-ray examination of the samples were inadequate to determine whether the product was crystallized. The Court has examined well crystallized and vitreous basalts and is satisfied that a crystal product can be visually distinguished from a glass one. Also Corning did conduct X-ray diffraction tests on these samples to see if they were crystalline. These X-ray diffraction tests were accurate enough to tell whether an object was well crystallized or all glass. There was nothing misleading about the report of these tests and, at that time, they were the most reliable tests known, as plaintiff's patent solicitor represented to the patent examiner.

Defendant's final criticism of the Klingsberg affidavit is that Klingsberg only reported the results from 5 out of 8 samples treated. However, the three samples not discussed in the affidavit were treated at 950°-1000° C., which heat treatment was not taught by Watson. There was no reason to include them. Furthermore, defendant attempts to draw the implication that these unreported samples were well crystallized but there is no evidence that they were more crystalline than the others.

Finally, defendant attacks the Kivlighn affidavit in that the records underlying the affidavit show substantial crys-

tallization of the Watson product while the affidavit itself implies a small amount of crystals. It is obvious that the underlying records support the affidavit and no further discussion of it is warranted.

Having considered the affidavits and the points raised by the defendant, the Court concludes that the affidavits were neither intentionally misleading nor misleading at all. Nevertheless, one bothersome point remains and that is the representation by plaintiff's patent solicitor to the patent examiner that basalts do not contain TiO_2. Undoubtedly, this statement is false since all basalts contain some TiO_2. However, the evidence indicates that the statement was innocently made.[34]

The statement appears in a written argument made to the patent examiner in connection with the amendment accompanying the Klingsberg affidavit. The context in which the statement was made is a recapitulation of an interview between the solicitor and the patent examiner. If the statement were made with fraudulent intent during an oral interview of which there is no record, surely the solicitor would not include it in a written record. This is especially true since in his written argument he disavows that he is relying on the TiO_2 content of basalts. Moreover, Corning had a patent application written by the same solicitor pending before the same examiner at this same time. This application explicitly stated that TiO_2 was present in basalts. It is impossible for this Court to conclude that an attorney, especially one familiar with patent application procedures, would have made such contradictory statements which were readily apparent and subject to the scrutiny of the same

[34] The issuance of a patent upon the basis of an innocent misrepresentation of fact in the Patent Office serves only to destroy the presumption of validity of the patent. Huston v. Buckeye Bait Corp., 145 F. Supp. 600 (S. D. Ohio 1955), affirmed 237 F. 2d 920 (6 Cir. 1956). However, this assumes that the innocent misrepresentation had a substantial bearing on the issuance of the patent.

patent examiner, unless innocently made. Also, this statement was made in relation to three claims, two of which were immediately rejected and the third cancelled. The examiner could not have relied on it and consequently the presumption of the validity of the patent remains.[35]

In summary, the Court concludes that the doctrine of unclean hands is not applicable to the facts of this case.

INOPERATIVENESS

Defendant has attacked the patent on the grounds that the patent claims are too broad in that they cover "inoperative compositions." The law is clear that a patent claim is unenforceable which, under a reasonable construction of the claim, asserts a monopoly broader than the invention.[36]

The attack only goes to the method claims since the product claims describe a result. Nothing could be inoperative but the means to reach the desired end product. The defendant has not established that inoperative compositions are included within the method claims. Defendant did not offer any proof at trial concerning any compositions that were inoperative. Instead, defendant attempted to rely on Corning's reports which covered various experiments done by Corning in developing commercial pyroceram products. Howover, none of these reports satisfactorily establish that compositions within claim 1, the broadest method claim, are inoperative. Some of the compositions were not glass making compositions as required by the method claims; some were abandoned because they were not considered the best or cheapest commercial products; and others were discarded with the intent

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[35] See footnote 34, *supra*.

[36] E.g., Lincoln Engineering Co. v. Stewart-Warner Corp., 303 U. S. 545 (1938); Patrol Valve Co. v. Robertshaw-Fulton Controls Co., 210 F. 2d 146 (6 Cir. 1954).

to investigate them further at a later time. A conclusion of inoperativeness cannot be reached based on these assertions. Since defendant has failed to make even a prima facie showing of inoperativeness, the Court has not considered each assertion separately.

INDEFINITENESS AND VAGUENESS

Defendant attacks the patent in issue because of the vagueness of the claims since they require independent experimentation to determine (1) whether a given glass formula will make a pyroceram, (2) the size of the resulting crystals and whether they interlock, and (3) percent crystallinity. However, prior to considering these assertions, a preliminary issue—whether the 50% crystalline criteria is definite within the meaning of 35 U. S. C. A. § 112—must be decided.

The claim language itself, 50% crystalline, is definite; thus the holding of many of the cases cited by defendant[37] is inapplicable. In those cases, the courts were concerned with the inexact word descriptions of the claims. Here, the 50% limitation is an exact description; however, the alleged ambiguity arises because there is no way to accurately measure the percent crystallinity of the end product, a measurement required by all the claims in the patent.

At the time of the patent application, 1956, the margin of error in determining percent crystallinity of a particular glass ceramic by X-ray diffraction, the test procedure described in the patent, was in the range of from 7 to 10%. Thus if it is determined that a product was 50% crystalline, in actuality the crystallinity could vary between 40% and 60%, if the outer limit of the margin of error is used.

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[37] E.g., United Carbon Co. v. Binney & Smith Co., 317 U. S. 228 (1942); General Electric Co. v. Wabash Appliance Corp., 304 U. S. 364 (1938); Fruit Treating Corp. v. Food Machinery Corp., 112 F. 2d 119 (5 Cir. 1940), cert. denied 311 U. S. 679 (1940).

Based on this margin of error, Anchor argues that the limits of the patent are indefinite by the standards of 35 U. S. C. A. § 112. The defendant asserts that the state of the art at the time of the application is the touchstone to be used in defining the descriptions and tests in the patent. Otherwise, it can be argued, the scope and limitations of the patent monopoly would vary as tests and meanings change and the learning in the field becomes more sophisticated.[38] On the other hand, the plaintiff argues that the time of the issuance of the patent should be controlling. The measurement of the limits is to inform the public when it is transgressing on the patent monopoly. Consequently, since the patent application is confidential until issuance, the public has no way or reason to determine if they are infringing the patent until it issues. Thus, the plaintiff asserts this date is the critical time to determine the definiteness of the patent.[39] It is unnecessary to resolve this issue because the same 7 to 10% error existed at the time the patent issued.

Still to be resolved is the issue whether this 7 to 10% margin of error in determining percent crystallinity is so great as to make the patent claims indefinite within 35 U. S. C. A. § 112. The purpose of the indefiniteness doctrine was explained by the Supreme Court:

> "The limits of a patent must be known for the protection of the patentee, the encouragement of the inventive genius of others, and the assurance that the subject of the patent will be dedicated ultimately to the public."[40]

Considering the first purpose given for the definiteness of the claims, i.e., the protection of the patentee, the margin of error found here should not invalidate the patent. If the

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[38] Defendant cites as authority for its position Raybestos-Manhattan, Inc. v. Texon, Inc., 268 F. 2d 839 (1 Cir. 1959).

[39] Plaintiff cites for its position Helene Curtis Industries v. Sales Affiliates, 233 F. 2d 148 (2 Cir. 1956), cert. denied 352 U. S. 879 (1956).

[40] General Electric Co. v. Wabash Appliance Corp., 304 U. S. 364, 369 (1938).

patentee defines his invention by the use of limits which are subject to a certain margin of error in measurement, the patentee cannot expect protection within this margin. Whenever the measurement of the product produced by competition falls within this range of error in measurement, there would not be infringement. In the instant case, if a competitor produced a product which, on measurement by X-ray diffraction showed 59% crystallinity, it would be entitled to a judgment of noninfringement because within the limits of measurement preciseness of 10% error it is possible that the competitor's product is only 49% crystalline; consequently it falls outside the claim limits of the patent. Thus the patentee is protected although his protection may be more limited than he desires.

This interpretation does not run afoul of the second purpose of the indefiniteness doctrine for a competitor can experiment freely within this area of measurement error without fear of infringing the patent. Moreover, the third purpose is upheld since no one can obtain a patent within the patent claims because it has already been publicly disclosed. Ultimately the public will get the benefit of a public dedication of the actual area covered by the patent monopoly.

Interpreting claims as narrowly as possible when considering the patentee's protection, i.e., at the limits which gives the patentee the smallest monopoly and interpreting them broadly when considering the public dedication of the patent not only upholds the policy of the indefiniteness doctrine when considering measurement error, but also serves the purpose of not invalidating every patent litigated in which measurement is important. Otherwise, every such patent could be invalidated because every measurement technique has some margin of error.[41]

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[41] This Court does not mean to intimate that all measurement errors can be handled in this manner; but only in an uncrowded field where the measurements are not critical in distinguishing the prior art. Moreover, the error could be so large as to be no measurement at all, for example, a 50% error.

Defendant also has argued that the 50% limit is meaningless because there is no sharp cleavage at 50% crystallinity between desirable and undesirable products. The change in properties begins at approximately 40% crystallinity and in most cases is complete at 60%. Because the change begins at 40% plaintiff could have claimed all products of 40% crystallinity and upwards; but a patentee is under no duty to claim to the ultimate limits of his invention. He can surrender part of his invention to the public.

However, the patent is unenforceable because in 1956, when the application was made, and in 1960, when the patent issued, to determine the percent crystallinity within this 7 to 10% margin of error required costly and lengthy independent experimentation to devise a test to ascertain whether a product was within the bounds of the patent claims. Even though the Patent Office did not require the 50% limitation in the patent, the patentee included this limitation and relied upon it to distinguish his patent from the prior art. Consequently, the public is entitled to experiment in this glass ceramic area and related fields up to the 50% crystallinity without being compelled to independently experiment to determine the limits of the patent claims. The Third Circuit established the controlling guideline in Standard Oil Co. of California v. Tide Water Associated Oil Co.,[42] when it stated:

> "The most immediate test of sufficiency of precision in description following from the policy just outlined is that no inventor may compel independent experimentation by others to ascertain the bounds of his claims."[43]

This test is applicable here. A patentee cannot foist a great financial burden on another to develop a new measure-

[42] 154 F. 2d 579 (3 Cir. 1946).

[43] 154 F. 2d at 582-583.

ment technique to determine whether he is infringing the patent. This is part of the burden and expense which the patentee must bear in order to obtain a patent monopoly.

The patent in suit states that the percent crystallinity could be determined by X-ray diffraction, the only test described. However, Corning at the time of its patent application, had not measured any of the various examples in its patent for percent crystallinity and Corning's witnesses admitted that it would take too long and be too difficult to measure the examples for percent crystallinity.

In 1956 two weeks before the patent application, Corning's records show that it was impossible to determine percent crystallinity by X-ray diffraction. In 1958 Corning was still unable to determine percent crystallinity of a glass ceramic by either X-ray diffraction or electron microscopy, although it was possible to determine this percentage roughly by chemical analysis.[44] Finally, by 1964, with the help of new techniques which were developed after a year of independent experimentation, Corning's experts were able to make an estimate of the crystallinity in the glass ceramics within a 4 to 5% range of error. A description of this new technique was first published in 1964, about eight years from the time of the patent application and four years after it was issued.

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[44] This Court does not mean that the best way of determining the limits of the claims must be set forth in the patent; however, the test set forth must be reasonably certain to distinguish patented and unpatented products. As Judge Kirkpatrick has stated:

> "All that is necessary is that the patentee make as full disclosure as he reasonably can and that he describe the product with sufficient particularity that it can be identified and that those who are interested in its manufacture are enabled to determine what will and what will not infringe."

Benger Laboratories, Limited v. R. K. Laros Company, 209 F. Supp. 639, 642 (E. D. Pa. 1962), affirmed per curiam, 317 F. 2d 455 (3 Cir. 1963), cert. denied 375 U. S. 833 (1963).

District Court Opinion

Between the time the patent issued and the sale of its commercial products, Anchor spent a great deal of time and money trying to measure the percent crystallinity in its proposed commercial products. Anchor spent over $100,000 to determine the percent crystallinity; however, this includes the cost of an X-ray machine and the cost of training personnel to operate it. The training and equipment costs are irrelevant for a patentee does not have to pay the cost of teaching competitors to use measurement equipment or buy it. But, it cannot foist upon them the cost of developing a technique, which is not commonly known or available. Furthermore, Anchor had to obtain the help of four independent research sources[45] to devise test methods before being able to determine percent crystallinity within the 7 to 10% range of error. For this reason, the patent must be held invalid and it is unnecessary to consider whether the claims require experimentation (1) to determine whether a given glass formula will make a pyroceram, and (2) to determine the size of the resulting crystals and whether they interlock. Having reached this decision the problem of infringement need not be considered.

The foregoing opinion is adopted as the Court's findings of fact and conclusions of law pursuant to F. R. Civ. P. 52 (a), 28 U. S. C. A.

Submit order.

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[45] Battelle Memorial Institute at Columbus, Ohio, Mellon Institute at Pittsburgh, Pa., Pennsylvania State University at State College, Pa., and Radio Corporation of America at Camden, N. J.

Appendix to District Court Opinion

This Court has considered the recent Supreme Court cases[1] concerning patentability. Inasmuch as these cases reaffirmed the tests applied in the present case, no change in this opinion is necessary.

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[1] Graham et al. v. John Deere Co. of Kansas City et al., No. 11—October Term 1965 (U. S. Feb. 21, 1966); Calmar, Inc. v. Cook Chemical Co., No. 37—October Term 1965 (U. S. Feb. 21, 1966); Colgate-Palmolive Co. v. Cook Chemical Co., No. 43—October Term 1965 (U. S. Feb. 21, 1966); United States v. Adams et al., No. 55—October Term 1965 (U. S. Feb. 21, 1966).